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work in which the author promises to deal more fully with the methods of teaching. The present volume is full of suggestion to the teacher who desires a clear, analytical statement of the chief factors in the teaching process.

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*Experiments in Educational Psychology.* By DANIEL STARCH. New York: Macmillan, 1911. Pp. vi+183. \$0.90 net.

This book is a pioneer in the new field of educational psychology. The author was therefore confronted with the difficult task of selecting such experiments from the broad field of experimental psychology as would have a bearing upon education, or of devising new experiments. He had further to organize these experiments into a coherent course. The principle of selection and of organization is evident from an inspection of the topics which are treated and their order in the book. In general the subject-matter of the experiments consists in the psychological processes as they have been isolated and defined in general psychological analysis. Thus there are tests of sensation, imagery, learning, association, apperception, attention, memory, and work and fatigue. The course is introduced by an experiment on individual differences. It will be seen that the order of the topics is that followed in general psychological analysis. The purpose of the experiments may be said, then, to be the examination of such general psychological principles as have most direct bearing upon education.

This is one type of educational psychology. It may be pointed out that there is also another, and at least equally productive, type, which consists in the experimental analysis of specific educational processes, such, for example, as reading, writing, spelling, and counting. Certain types of statistical study which are psychological in their nature are also being effectively applied to the solution of educational problems.

It may be said in general that the experiments which the author has chosen have been well worked out and adapted to their purpose. One feature which may have been suggested by Seashore's *Experiments in Psychology*, and which will be found of great convenience, is that all the material or apparatus necessary for the experiments is furnished in the text or may be easily obtained. This has necessitated considerable skill in the selection and developments of methods. A good feature, which might have been still further extended, is the list of questions in application of the principles which have been determined, given at the end of some of the chapters. Another good device consists in a series of tables or figures showing typical results which have been obtained by the methods prescribed.

A few points of criticism in matters of detail may be made. In the opposite test it seems to the reviewer to vitiate the experiment to have the observer write his answers, since there is time while writing one opposite to think of the next one, and there is as a result a test of speed of writing instead of a test of association. The experiment on the vividness of mental images seems too elaborate for its purpose in such a course as this. In the test of bi-lateral transfer in the learning experiment, which consists in tracing a star in a mirror, the observer is directed to trace the first half of one star with the left hand before the practice series with the right hand, and the remainder after the practice with the right hand. It would be better to trace the complete star in the first trial with the left hand so that the progress between this and the second trial with the left hand, made after the practice series with the right hand,

might be compared with the progress between the first and second trials with the right hand. A greater amount of improvement comes within the first figure than between the first and second, and thus a large part of the apparent effect of the practice with the right upon the left is illusory. In the third section of the tests for attention the observer is asked to look at a group of words consisting of five English words and twenty Greek words, and the fact that the English words are remembered in greater proportion than the Greek words is ascribed to the clearer comprehension of the English words. But in a group of five italicized words and twenty words in ordinary type the italicized words were noticed in greater proportion than the unitalicized. This is ascribed to contrast. At least part of the result in the former case was also, then, due to contrast, and in order to isolate the effect of clearness an equal number of English and Greek words should be chosen. In the fourth section, under attention, the "law of counter attraction" is illustrated by the fact that one can grasp about all of a group of five words, half of a group of ten words, and one-fifth of a group of twenty-five words. This would seem to be due rather to the limitation of the scope of attention. Finally, in the experiment on memory, two selections are given to be memorized, the one by the whole and the other by the part method, with a view to comparing the efficiency of the two methods. It is evident, however, that the shortness of the selections—eight lines each—makes them especially adapted to the whole method, and that a study of the relative applicability of the two methods should include longer and more difficult selections.

As was said at the beginning, this work is a pioneer in the field, and as such is a valuable contribution to educational psychology, for which every worker in the field will be grateful. It will doubtless be widely used as a text where courses in educational psychology are given, and will be freely borrowed from even when not used as a text.

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*Practical Botany.* By JOSEPH Y. BERGEN and OTIS W. CALDWELL. Boston: Ginn & Co., 1911. Pp. vii+545. Illustrated.

This book represents very clearly a breaking away from the conventional text for high-school botany. Its authors are well known as successful writers of botanies for high schools, and this volume, as was to be expected, sustains their reputation for good science and good book-making. The keynote is no longer the discipline of the laboratory, but the acquisition of information regarding the world's work. For the last five years the schools have been beset on all sides with the clamor for vocational studies, and the school men, in the writer's opinion, have not courageously met and directed the demand for change. It seems to be accepted that change we must have. Business and manual training and agriculture would crowd from their time-honored seats the classics and pure science.

Confining our review to biological studies, it may be said that various methods have been suggested for meeting the situation. Some desire that botany and zoölogy be replaced by agriculture and the so-called civic biology; others would precede these more practical courses by courses in botany and zoölogy; while still others would make a sort of combination of applied and pure science, both to be given in a single course.